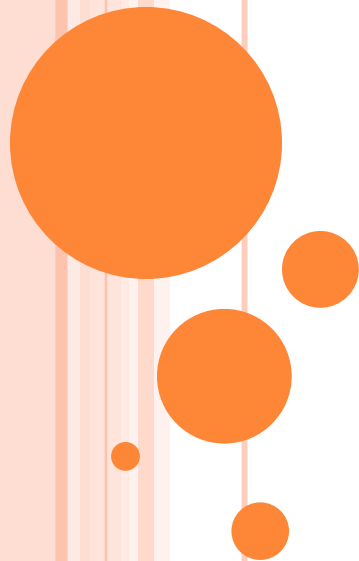


ASSESSMENT OF MEDICAL GAS SYSTEM IN PARAS HOSPITAL,GURGAON

SUBMITTED BY

**DR.PRASHANSA DUBEY
HOSPITAL BATCH
ROLL NO.1478**



CONTENTS

- INTRODUCTION
- RESEARCH QUESTION
- AIM
- OBJECTIVES
- RATIONALE OF THE STUDY
- DATA ANALYSIS
- DATA INTERPETATION
- ISSUES
- RECOMMEDATIONS



INTRODUCTION

Medical gas has been used in clinical practice for more than 200 years, it is the basic life support requirement of any modern secondary/ tertiary care hospital.

But sometimes due to interruption or the delay of these gases can cause harm to the patient. Therefore it is very important to see that the planning and designing of the hospital should be in such a way that the supply of these gases should be smooth which would help to reduce the incidence related to it and cost of the medical gas supply system to the hospital should be minimum.



RESEARCH QUESTION

Q .What is the present state of medical gas system in Paras hospital and issues related to it?

Q. What is the approximate annual total gas consumption a cost incurred in medical gas cylinders of Paras hospital?



AIM

To study in detail about the medical gas system, gas consumption, cost incurred in gas cylinders yearly and to identify the various issues which causes interruption in the supply of these gases.

OBJECTIVE

- To assess the medical gas system in Paras hospital
- To estimate the annual consumption of gas cylinders and cost incurred on the basis of data analysis of last two months.
- To identify the various issues which causes the interruption and delay in supply of gases
- To propose solutions which would increase the efficiency of medical gas system in Paras hospital



RATIONALE OF THE STUDY

- Increase the efficiency of the medical gas department
- Base study for Planning and designing of medical gas department in the upcoming hospital of Paras group



STUDY DESIGN AND METHODOLOGY

- Type of study: Observational, quantitative, Analytical Study.
 - Area of study: Medical gas department
 - Study subjects: last 2 months data
 - Study period :Feb 2015 to April 2015
 - Study variables: Total gas outlets, number of gas cylinders, machines, and amount of gas consumed.
 - Study hours:100 hrs(subjects will be recorded 2 hrs each in morning and evening shift)
 - Source of data
 - i. Primary data: Observational.
 - ii. Secondary data: Published studies and research papers, Academics Publications, Journals
- 

DATA COLLECTED:-

- Occupancy rate in the month of January in Paras hospital =56.08%
- Liquid oxygen consumption in the month of January=11450 cubic ft.
- Total no. of cylinders consumed in the month of January

Cylinders	Type D	Type B	Type A	Type AA
Oxygen	3	124		13
Nitrous oxide	11		1	
Carbon dioxide		4	1	
Nitrogen	11			

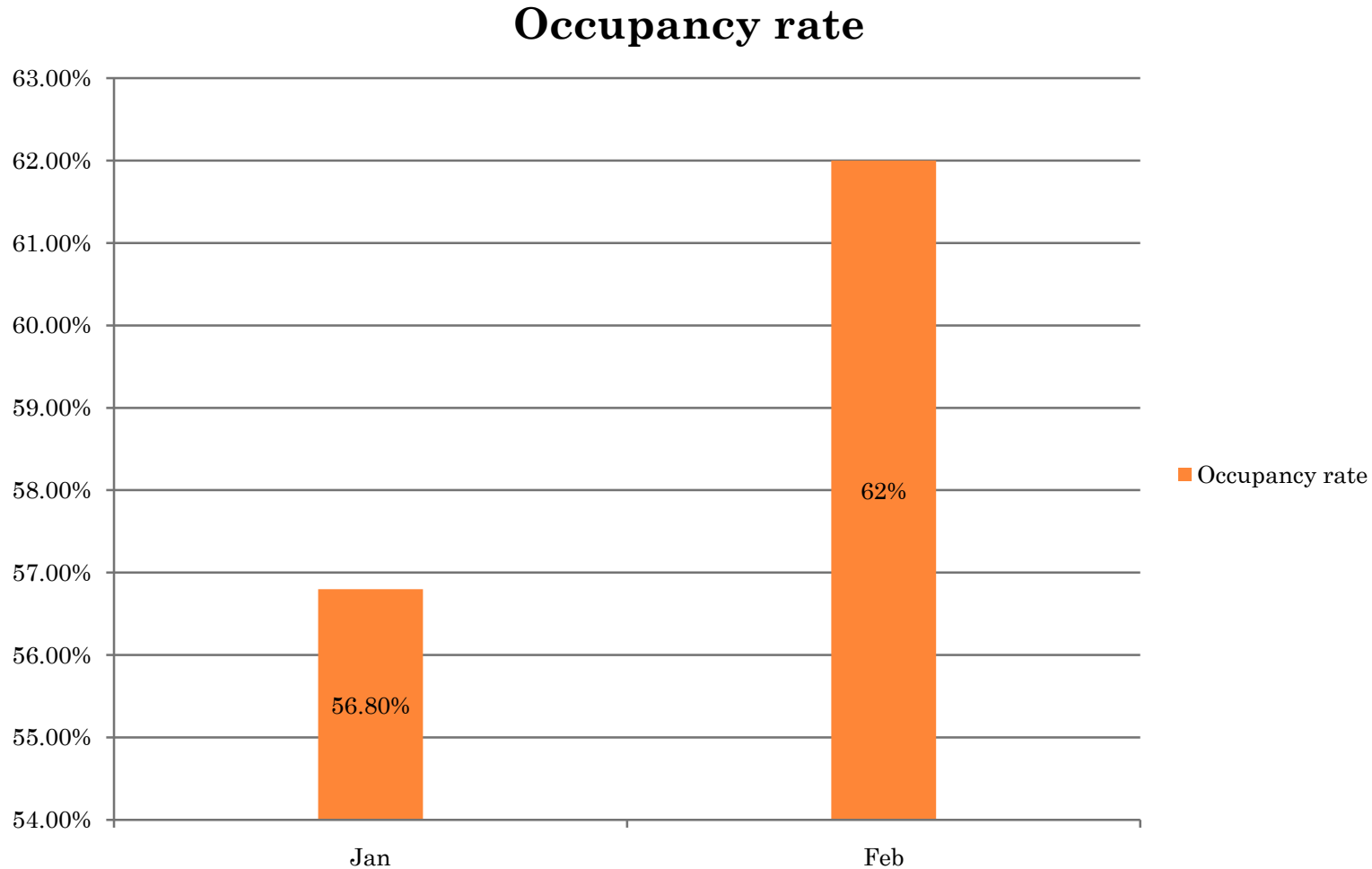


- Occupancy rate in the month of February =62.1%
- Liquid oxygen consumption in the month of February=11450 cubic ft.
- Total no. of cylinders consumed in the month of February

Cylinders	Type D	Type B	Type A	Type AA
Oxygen	8	165	2	29
Nitrous oxide	13		1	
Carbon dioxide		4	1	
Nitrogen	12			



FIG-1.1 SHOWING THE OCCUPANCY RATE IN THE MONTH OF JANUARY AND FEBRUARY



ON THE BASIS OF LAST 2 MONTHS DATA, AVERAGE CONSUMPTION OF DIFFERENT GAS CYLINDERS WHEN OCCUPANCY RATE ON AN AVERAGE IS 59% IS AS BELOW

FIG 1.3 SHOWS THE AVERAGE NUMBER OF GAS CYLINDERS USED IN A MONTH IN PARAS HOSPITAL

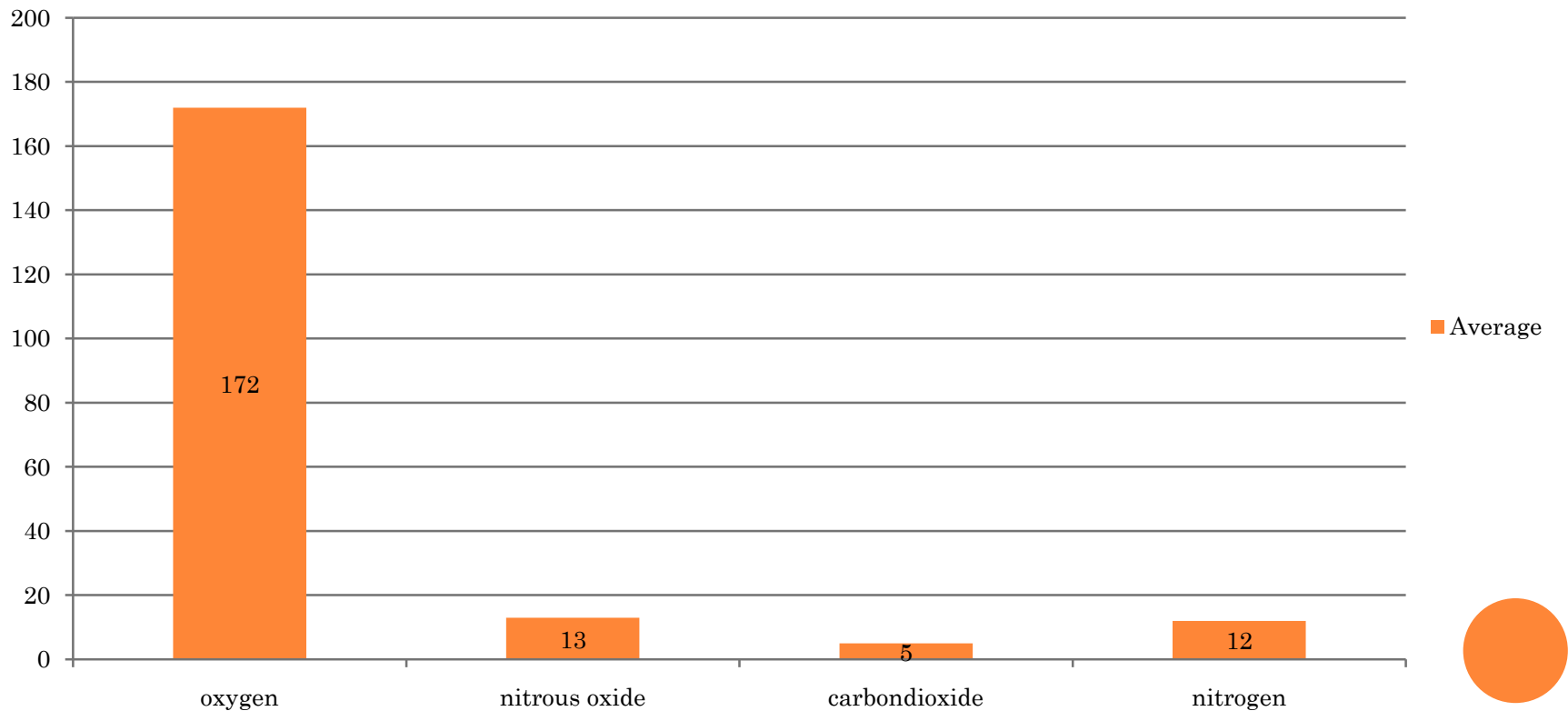


FIG 1.4 SHOWS THE NUMBER OF TYPE OF OXYGEN CYLINDERS USED IN THE MONTH OF JAN AND FEB (COMBINED)

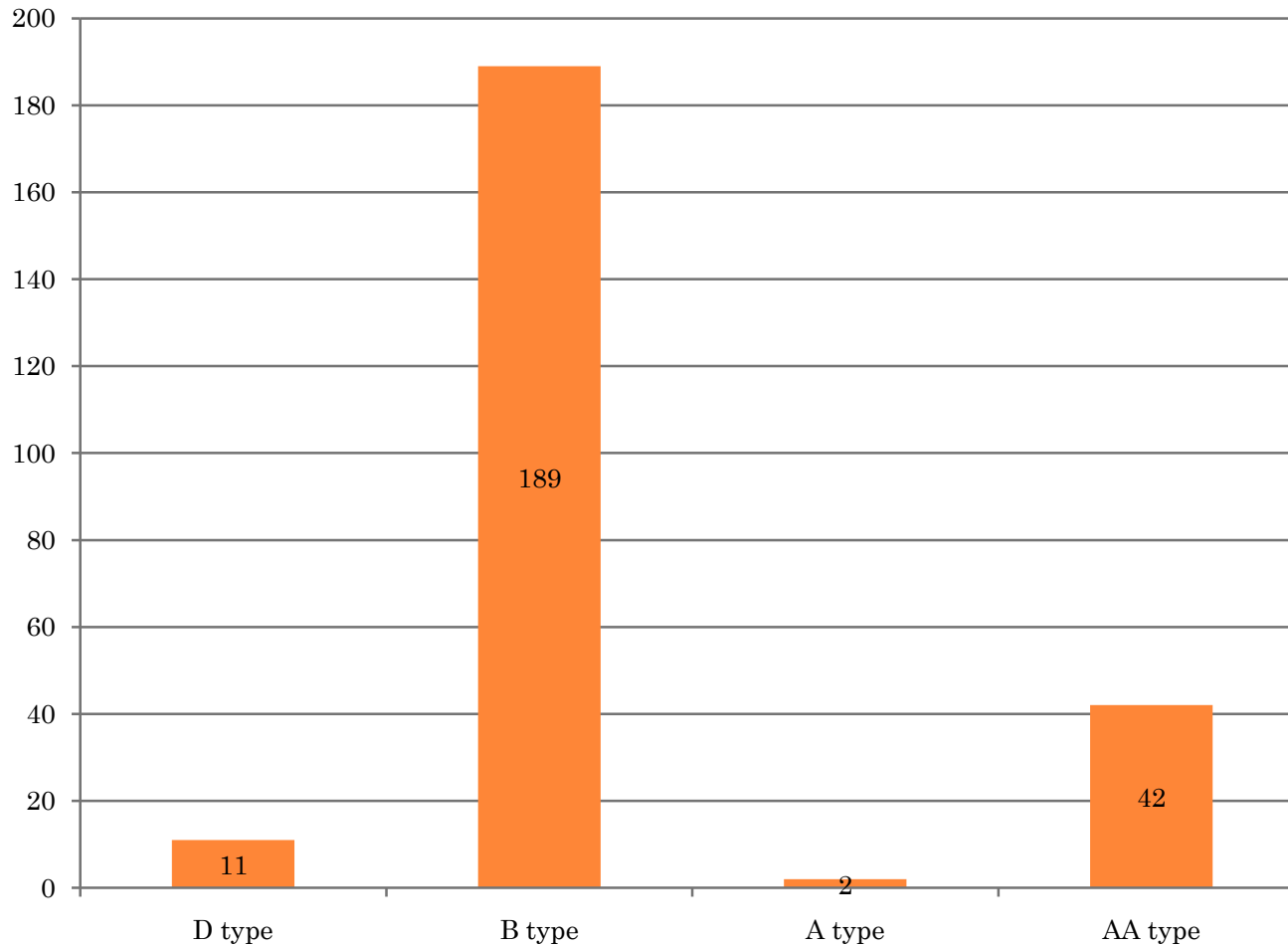


FIG-1.5 SHOWS TYPE OF TOTAL NUMBER OF NITROUS OXIDE CYLINDERS USED IN THE MONTH OF JANUARY AND FEBRUARY

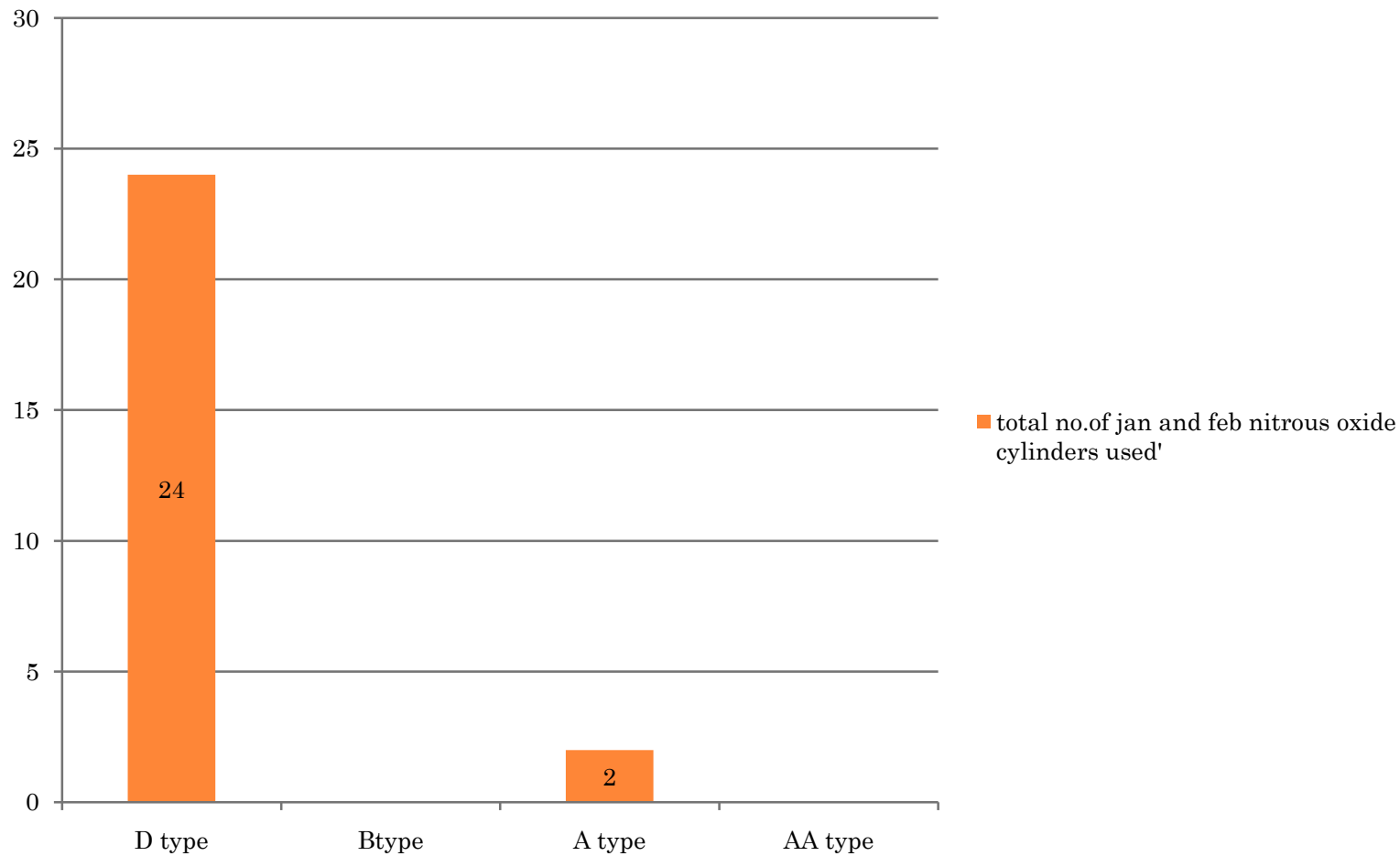


FIG 1.6 SHOWS TYPE OF TOTAL NUMBER OF CARBON DIOXIDE CYLINDERS USED IN THE MONTH OF JANUARY AND FEBRUARY

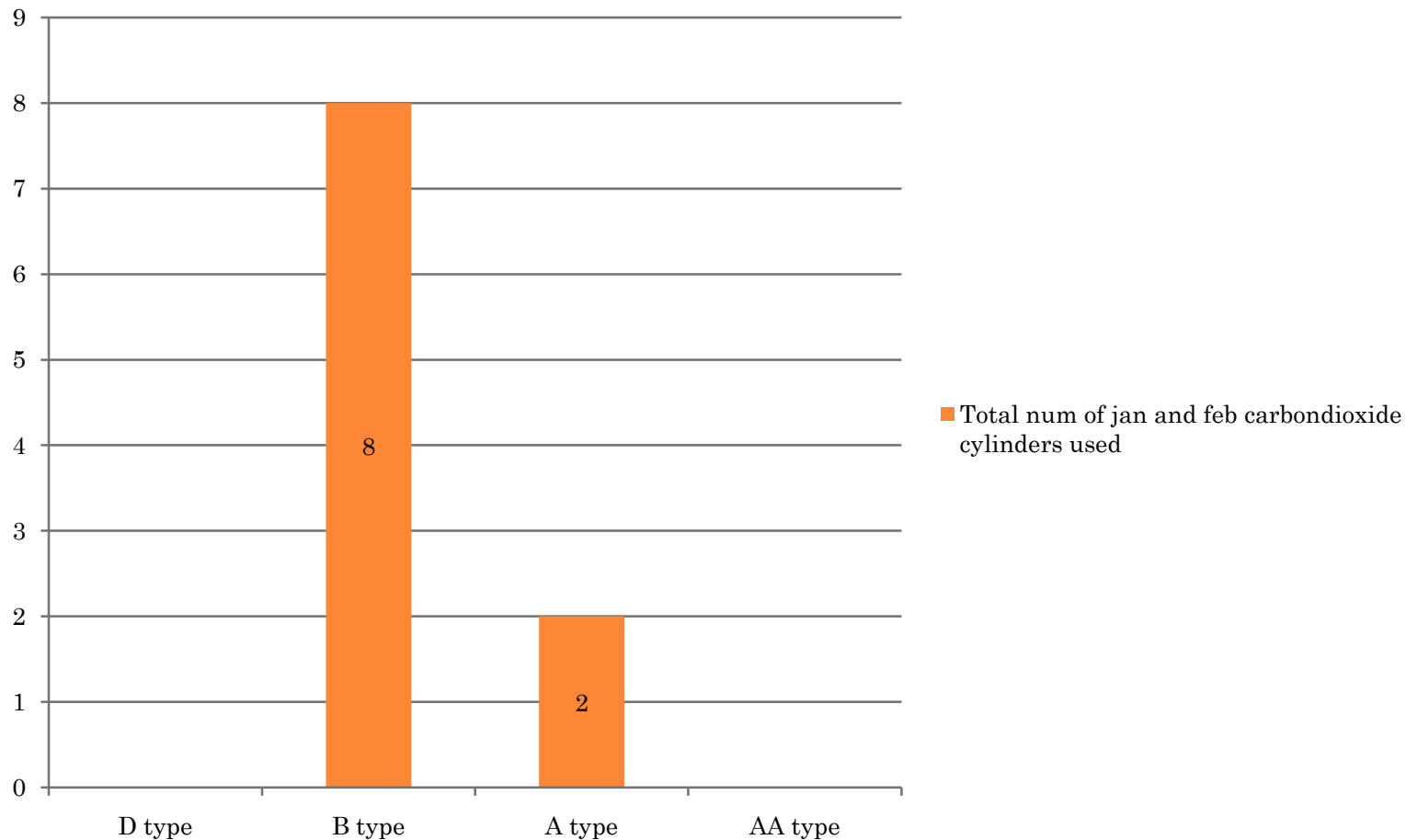
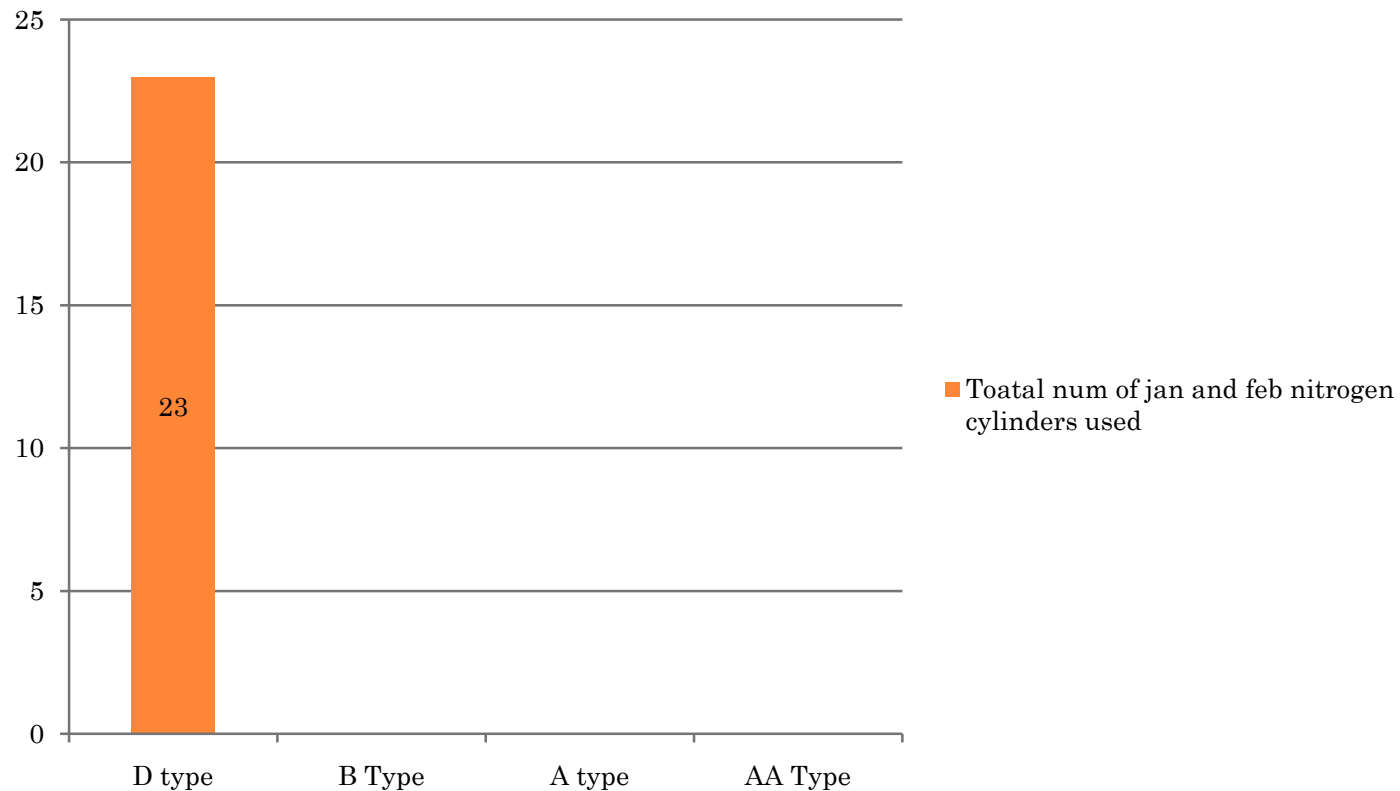


FIG 1.7- SHOWS TYPE OF TOTAL NUMBER OF NITROGEN CYLINDERS USED IN THE MONTH OF JAN AND FEB.



DATA INTERPRETATION:

TOTAL CONSUMPTION OF GAS ANNUALLY

The average occupancy rate of Paras Hospitals is 59%, hence approximate numbers of gas cylinders and liquid gas consumed in a year are:

- Oxygen cylinders: $172 \times 12 = 2064$ (D=93, B=1599, A=17 and AA=355)
- Nitrous oxide cylinders: $13 \times 12 = 156$ (D=144 and A=12)
- Carbon dioxide cylinders: $5 \times 12 = 60$ (B=48 and A=12)
- Nitrogen cylinders: $12 \times 12 = 144$ (D=144)
- Liquid oxygen gas: $11450 \times 12 = 137400$ cubic ft.



COST OF CYLINDERS(MONTHLY)

Cylinders	Type D	Type B	Type A	Type AA
Oxygen	Rs 149	Rs 85	Rs 72	Rs 72
Nitrous oxide	Rs 3025		Rs 385	
Carbon dioxide		Rs 468	Rs 275	
Nitrogen	Rs 418			



DATA INTERPRETATION

Cost incurred in different types of gas cylinders annually are:-

- Oxygen cylinders-D type $93 \times 149 = \text{Rs } 13857$
B type $1599 \times 85 = \text{Rs } 135915$
A type $17 \times 72 = \text{Rs } 1224$
AA type $355 \times 72 = \text{Rs } 25560$
- Nitrous oxide cylinders-D type $144 \times 3025 = \text{Rs } 435600$
A type $12 \times 385 = \text{Rs } 4678$
- Carbon dioxide cylinders-B type $48 \times 468 = \text{Rs } 22464$
A type $12 \times 275 = \text{Rs } 3300$
- Nitrogen cylinders-D type $144 \times 418 = \text{Rs } 60192$

Total annual cost of gas cylinders = Rs 702787

- In fig 1.1, fig 1.2, fig 1.3, fig 1.4, fig 1.5, fig 1.6, fig 1.7 we can clearly see as the occupancy rate increases the consumption of these gases also increases.
- Consumption of oxygen gas is highest among all.
- Oxygen B type cylinders demand is more compare to other type of cylinder.



ISSUES

Source of data-Observational, last 2 months data from complaint register maintained

- Cylinder regulator not working
- Leakage
- Suction not working
- Incorrect cylinder (connecting wrong cylinder at the inlet)
- Humidifier bottle cap broken
- Malfunctioning flow meters
- Damaged valve
- Pressure problems – less or more
- Alarm problems



FIG 1.8 SHOWS THE COMMON ISSUES OF THE MEDICAL GAS DEPARTMENT

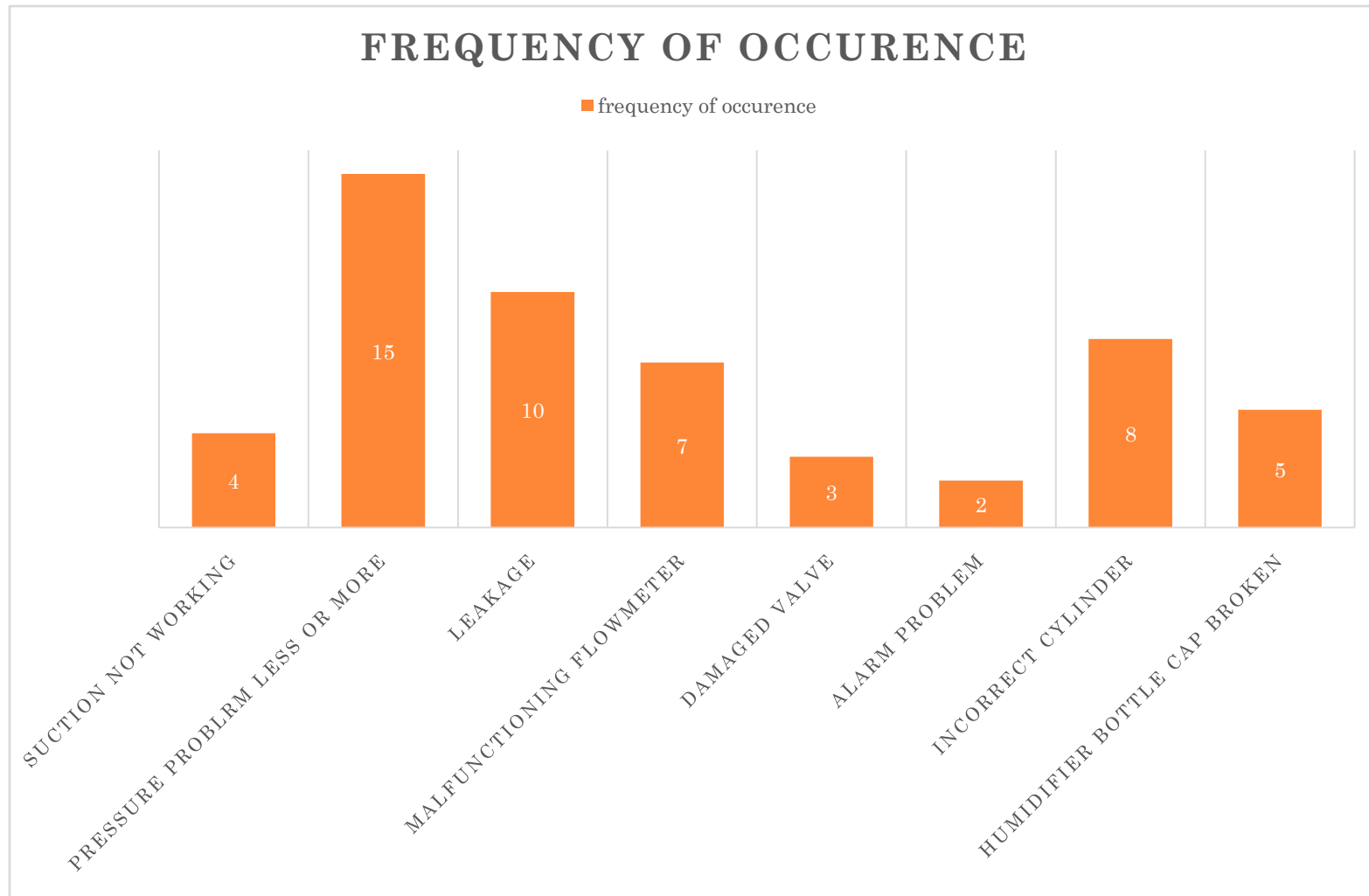
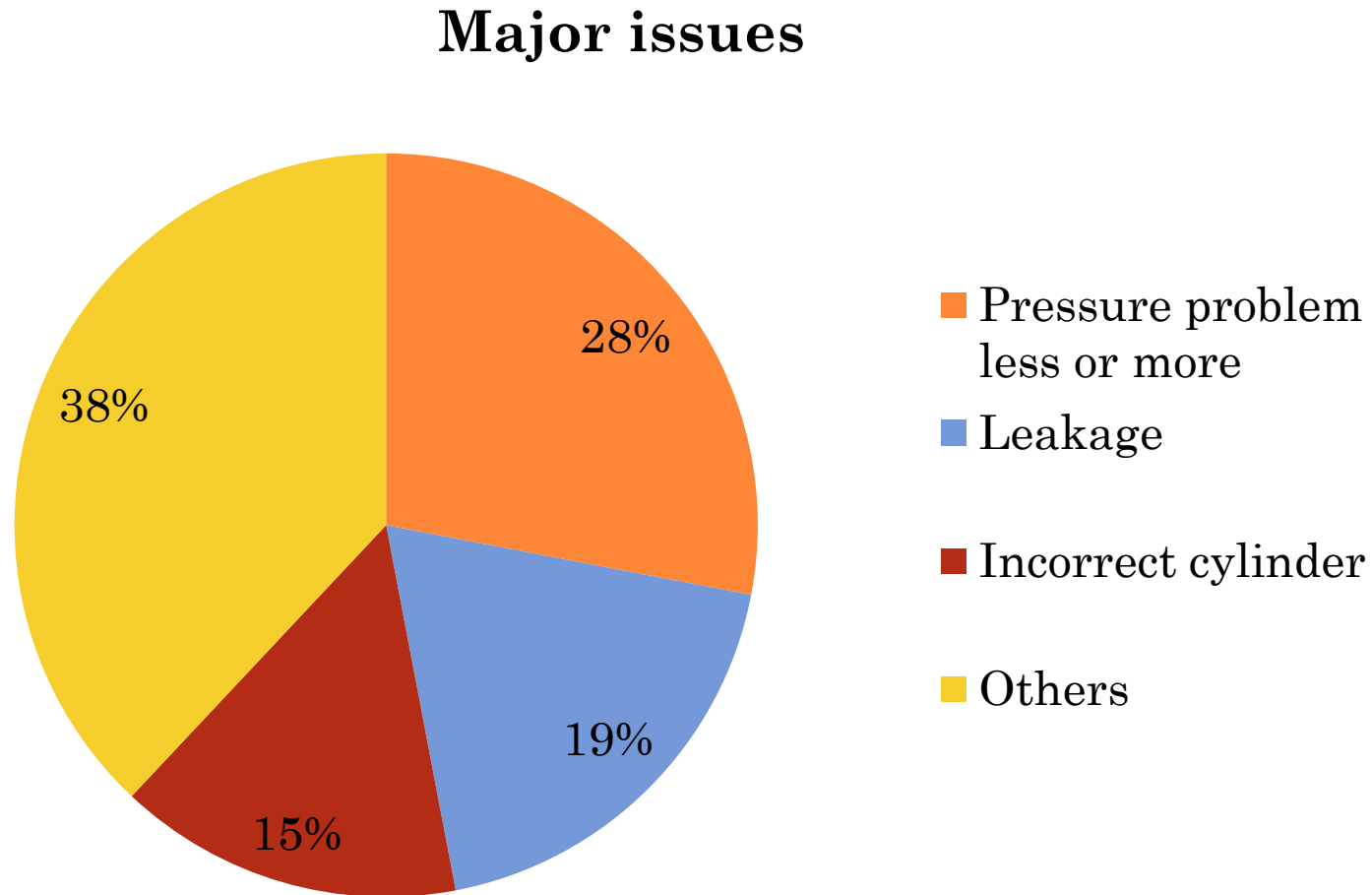


FIG 1.9 SHOWS THE MAJOR ISSUES OF THE MEDICAL GAS DEPARTMENT



MAJOR ISSUES

PRESSURE PROBLEMS-LESS OR MORE

- Inadequate pressure is most frequently reported malfunction
- Anaesthesia ventilators require a minimum driving gas pressure to operate properly.
- Excessive pressures can cause damage to equipment and baro trauma to patients. Some ventilators may not function if excessive pressure is built up in system.
- Most common cause of high pressure is regulator failure.

LEAKS

- Leaks in the System are extremely common.
- If oxygen accumulates in closed space, it can pose fire.
- N₂O leak into OT may contaminate and pose problem to OT personnel.

INCORRECT CYLINDERS

- Connecting wrong cylinder at the inlet can cause major harm to the patient.



FINDINGS:

- Total approximate annual cost of gas cylinders=Rs 702787
- Total consumption o gas cylinders are:
 - Oxygen cylinders: $172 \times 12 = 2064$ (D=93, B=1599, A=17 and AA=355)
 - Nitrous oxide cylinders: $13 \times 12 = 156$ (D=144 and A=12)
 - Carbon dioxide cylinders: $5 \times 12 = 60$ (B=48 and A=12)
 - Nitrogen cylinders: $12 \times 12 = 144$ (D=144)
- Major issues are pressure less or more, leakage and connecting incorrect cylinder at the inlet



RECOMMEDATIONS:-

- There should be proper training of the persons working in medical gas department so that they can identify medical gas cylinders, connection valves, regulators, and the distribution system within a facility
- Medical gas technician should conduct scheduled shutdowns; establish protocol; maintain written policies and procedures; and remain informed of new standardized recommendations within the medical gas supply industry.
- Disaster Mock Drill should be carried out every 3 month to be ready in real emergency arises in future.
- Hospital should have enough backup system to provide the continuous transfer of gas to the patient at the correct pressure without any interruption.
- Apart from compressed Oxygen cylinders, portable liquid oxygen containers and oxygen concentrators should be kept ready.



- Do not drop a cylinder, strike two cylinders against one another, or strike other surfaces
- Racks, chains should be provided to individually to secure all cylinders from falling (whether connected, unconnected, full, empty)
- Clear disaster plan manual should be made ready.
- Maintenance has to be carried out as per the recommendations of the manufacturer. Pressure gauges, shutoff valves, pipes have to be inspected regularly.
- Special places like ICUs should be inspected and test results have to be documented. Regular checks will prevent sudden shutdowns and prevent great economical burden.



THANK YOU

